NATURAL RESOURCES

Marbled Murrelet Solutions Table Report

2018

For the Washington State Legislature, as Required by Engrossed Substitute House Bill 2285 (RCW 43.30.582)

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

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WASHINGTON STATE DEPARTMENT OF
NATURAL RESOURCES

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Acronyms

DNR	Washington Department of Natural Resources
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESHB	Engrossed Substitute House Bill
1997 HCP	*State Trust Lands Habitat Conservation Plan*
I-O	Input-Output
MMBF	Million board feet
USFWS	US Fish and Wildlife Service

Executive Summary

In 2018, the Washington State Legislature (Legislature) passed Engrossed Substitute House Bill (ESHB) 2285 (RCW 43.30.582-583). ESHB 2285 required the Washington State Department of Natural Resources (DNR) to establish an advisory committee for the marbled murrelet long-term conservation strategy. Named the "Solutions Table" by Commissioner of Public Lands Hilary Franz, this advisory committee includes members chosen to represent conservation, trust beneficiary, and jobs/economic-development perspectives. The Solutions Table's goal is to develop recommendations that benefit both the murrelet and the rural communities that could be affected by the long-term strategy.

ESHB 2285 also required DNR to develop and submit a report to the Legislature every year until the US Fish and Wildlife Service (USFWS) issues DNR an incidental take permit for the long-term strategy. **This is DNR's first report in fulfillment of ESHB 2285.** The report describes the potential economic losses and gains expected to result from the long-term strategy and summarizes the Solutions Table's progress to date on the development of the recommendations required under ESHB 2285.

This report was authored by DNR staff with review and input from Solutions Table members. However, this report does not necessarily reflect each member's opinion about certain issues. Key areas of disagreement are noted.

Why the Long-term Strategy is Needed

DNR manages over 2 million acres of forested state trust lands on behalf of trust beneficiaries such as counties, schools, and universities. Timber harvest on these lands provides funding for vital services and infrastructure in communities across the state.

One of the laws DNR must meet when managing these lands is the Endangered Species Act (ESA). To meet the requirements of this law, DNR adopted the *State Trust Lands Habitat Conservation Plan* (1997 HCP) for forested state trust lands in western Washington. An HCP is a long-term management plan that includes a suite of habitat conservation strategies focused on threatened or endangered species, and is a required component of an application for an incidental take permit. Incidental take is harm or harassment of individuals of a listed species when such take is incidental to, not the purpose of, lawful activities. Incidental take can include modification or harvest of habitat.

The 1997 HCP includes a marbled murrelet, northern spotted owl, riparian, and multispecies strategy. However, because knowledge of marbled murrelet biology was limited at the time, the marbled murrelet conservation strategy in the 1997 HCP was considered interim, to be replaced with a long-term

conservation strategy when more information was available. **DNR now is in the final stages of developing the long-term strategy.** When completed, the strategy will cover all forested state trust lands within the marbled murrelet's range in Washington, which spans 55 miles inland from marine waters.

A small seabird that feeds in the ocean and nests on the large branches of older, mature trees, the marbled murrelet was federally listed as threatened in Washington, Oregon, and California in 1992. While the direct causes for marbled murrelet population declines are unknown, potential factors include a loss of nesting habitat (mature forest), changes in the marine environment that affect the availability and quality of prey (fish), and increased abundance of nest predators such as jays and crows.[1]

Finding the Right Balance

DNR currently restricts harvest on 567,000 acres of DNR-managed lands to meet the requirements of DNR's 1997 HCP and *Policy for Sustainable Forests*. These lands will provide long-term habitat benefits for the marbled murrelet and other species. As well, DNR restricts harvest on an additional 33,000 acres specifically for marbled murrelets as part of the interim strategy, for a total of 600,000 acres.

Under the proposed long-term strategy, which will replace the interim strategy, DNR would restrict harvest on a total of 610,000 acres, which consists of the 567,000 acres already conserved plus 43,000 acres for murrelets. The result of restricting harvest on more acres will be reduced harvest volumes and economic activity and corresponding reductions in revenues for local government services such as school construction (these impacts will be discussed in detail later in this report).

DNR's decision space for determining how many acres to set aside is decidedly narrow. DNR must meet ESA requirements, including the issuance criteria for the incidental take permit. At the same time, DNR also must minimize negative impacts to trust beneficiaries to meet its constitutional and fiduciary responsibilities as a trust lands manager, which include laws of general applicability and the common law duties of a trustee (these responsibilities are collectively referred to as the trust mandate). As such, DNR cannot provide more habitat than required by the ESA, if doing so will negatively impact trust beneficiaries. For that reason, the long-term strategy will have two potentially unsatisfactory outcomes:

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[1] Miller, S.L., M.G. Raphael, G.A. Falxa, C. Strong, J. Baldwin, T. Bloxton, B.M. Galleher, M. Lance, D., Lynch, S.F. Pearson, C.J. Ralph, R.D. Young. 2012. Recent population decline of the marbled murrelet in the Pacific Northwest. Condor 114(4):1-11.

Falxa, Gary A.; Raphael, Martin G., tech. coords. 2016. Northwest Forest Plan—the first 20 years (1994–2013): status and trend of marbled murrelet populations and nesting habitat. Gen. Tech. Rep. PNW-GTR-933. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 132 p.

a contribution to murrelet conservation that is limited to ESA requirements, and negative economic and revenue impacts to some trust beneficiaries from conservation. (Note that some stakeholders disagree with DNR's legal interpretation of the trust mandate and believe DNR has more discretion to take additional steps to conserve the murrelet, while others feel that the amount of conservation DNR has proposed exceeds ESA requirements.)

These two legal drivers limit DNR's ability to avoid these outcomes. Therefore, **the Solution Table's work to develop creative and actionable recommendations to address these challenges is vital.**

The Solution Table's Goal and the Economic Analysis

The importance of the Solution Table's work to develop ways to further support the marbled murrelet is clear. Murrelet populations have **declined 3.9 percent *per year*** between 2001 and 2016[2] for the reasons stated previously.

In regards to economic impacts, the Solutions Table has discussed whether it is addressing only the potential, future impacts of the long-term strategy (as compared to the interim strategy), or is it also addressing the current economic condition of counties included in the long-term strategy *as well as* potential future impacts.

There is general consensus among Solutions Table members that their goal is the latter. Many counties are suffering *now*. For example, annual average forestry-related employment in the counties analyzed in this economic analysis fell from approximately 39,000 in 1990 to apprioximately 21,000 in 2017.

However, there is less consensus on how the economic analysis required by ESHB 2285 should be conducted. There is agreement that the long-term strategy should be represented in the analysis by Alternative H from DNR's environmental impact statement (EIS), because Alternative H is the preferred alternative adopted by the Board of Natural Resources (Board)[3]. However, some members disagree on the baseline DNR should use for comparison. Some members have suggested that the preferred alternative be compared to *all* of the alternatives DNR developed, not just the interim strategy. Some of these alternatives have more harvest and less conservation, and others have more conservation and less harvest than the preferred alternative. Others feel that the preferred alternative should be compared to the alternative that restricts harvest on the fewest acres, which is Alternative B. And some feel that DNR should be comparing the preferred alternative to pre-1997 economies.

[2] Pearson, S.F., B. McIver, D. Lynch, N. Johnson, J. Baldwin, M.M. Lance, M.G. Raphael, C. Strong, and R. Young, T. Lorenz, and K Nelson. 2018. Marbled murrelet effectiveness monitoring, Northwest Forest Plan: 2017 summary report. 19 pp.
[3] The Board sets policies governing the management of state trust lands.

DNR selected the interim strategy (Alternative A) as a baseline because it best represents how DNR would manage state trust lands in the absence of a long-term strategy. However, DNR did not believe it could accurately compare the potential economic impacts of the preferred alternative to pre-1997 economies because of the sheer scope of complexities and uncertainties that analysis would involve. Consider employment. It is difficult to determine how many forestry-related jobs have been lost specifically to past marbled murrelet conservation because of the multitude of factors that have affected the timber industry as a whole in the past several decades. Those factors include automation of tasks at mills and in the woods previously done by humans; conservation, not just for marbled murrelets but northern spotted owls; consolidation of mills and mill ownership; changes in overseas markets, which affect export and domestic log prices; conversion of working forest to non-forest uses; recessions; rising labor costs; and many others.

DNR understands that comparing Alternatives A and H does not tell the entire story of the impacts of murrelet conservation on the counties included in this analysis. However, DNR believes this comparison will assist the Solutions Table in addressing the challenge at hand, which includes addressing future as well as current economic impacts, and best meets the direction given in ESHB 2285.

Understanding the Potential Economic Impacts of the Long-term Strategy: Key Findings

At the scale of all state trust lands in western Washington **the differences in harvest volumes between the current, interim strategy and the proposed long-term strategy (the preferred alternative) are not large, ranging from -1.5 to 0.2 percent.** The primary reason is that the long-term strategy conserves only 10,000 more acres of habitat than the interim strategy. **Yet at the county level these changes can be meaningful. Some counties will see a decrease in the harvest volume while others see an increase.** Some of those counties that experience a decrease are **the least able to absorb it** because they are highly dependent on timber revenue. These counties have a large proportion of public lands, a relatively small tax base, and few options for diversifying their economies due to their distance from large urban centers.

In the first decade, **harvest volumes under the long-term strategy will be slightly higher than they would be under the interim strategy, but somewhat lower in every other decade**. When DNR adopts a long-term strategy, it will shift to managing special habitat areas and will release some areas of mature habitat outside these special habitat areas for harvest, resulting in a temporary increase in available harvest volume. These areas of mature forest currently are being held pending adoption of the long-term strategy. A special habitat area is a block of forest in which murrelet habitat is protected and

grown to minimize openings in the forest canopy that would give jays, crows, and other predators easy access to murrelet nests.

Finally, harvest levels decline under both the long-term strategy and the interim strategy through Decade 5. Harvest levels then gradually increase through Decade 10 under both strategies. In the cycle of harvesting and replanting forests, the total volume of timber available for harvest across DNR lands changes over time due to prior management, current stand ages, and tree growth rates.

Ecosystem Services

The economic analysis also includes information about potential economic gains of managing forests for ecosystem services, which are benefits gained from functioning ecosystems. Examples of ecosystem services include air and water filtration, food, medicines, and other benefits. Economic gains can come through a variety of payment mechanism such as carbon markets, watershed protection services, mitigation/conservation banking and green bonds, and even increased recreation on areas that are less heavily harvested. The Solutions Table can explore these options, along with numerous other creative ideas, as it moves through the investigative phase of developing recommendations.

Recommendations

The Solutions Table has generated numerous creative ideas and is now in the investigative phase, in which ideas are thoroughly vetted to translate them into a smaller list of specific, actionable recommendations. **This work is ongoing**. Rather than present a partial list of ideas under consideration, the Solutions Table would prefer to wait until the ideas have been **vetted, prioritized, considered in the context of all three interests, and sorted as described**. This report includes a description of the Solution Table's process and progress to date.

Introduction

This report to the Legislature is the first report required by ESHB 2285 (RCW 43.30.582-583), which was passed in 2018. As required, this report will include an **economic analysis** of potential losses or gains from any proposed marbled murrelet long-term conservation strategy selected by the Board, as well as a **discussion on recommendations** for actions that support rural economies and the marbled murrelet.

This report was authored by DNR staff with review and input from a marbled murrelet advisory group named the "Solutions Table" by Commissioner of Public Lands Hilary Franz. The Solutions Table was established under RCW 43.30.583. However, this report does not necessarily reflect each member's opinion about certain issues. Key areas of disagreement are noted.

This report will be presented in three sections. The first section will provide background on the long-term strategy, the second will include the economic analysis, and the third will discuss the Solutions Table's process and work to date on developing recommendations.

Section One: Background

DNR manages over 2 million acres of forested state trust lands on behalf of trust beneficiaries such as counties, schools, and universities. Timber harvest on these lands provides funding for vital services and infrastructure in communities across the state.

To meet its obligations under the ESA, DNR adopted the 1997 HCP for forested state trust lands in western Washington. An HCP is a long-term land management plan that is authorized under Section 10 of the ESA and prepared in partnership with USFWS and NOAA Fisheries. The 1997 HCP describes how DNR will meet ESA Section 10 issuance criteria with a suite of habitat conservation strategies focused on threatened or endangered species.

One of these species is the marbled murrelet, a robin-sized seabird that feeds on the ocean and nests on the large branches of older, mature trees in forests located within 55 miles of marine waters. The marbled murrelet was federally listed as threatened in Washington, Oregon, and California in 1992. While the direct causes for marbled murrelet population declines are unknown, potential factors include a loss of nesting habitat (mature forest), changes in the marine environment that affect the availability and quality of prey (fish), and increased abundance of nest predators[4]. Jays, crows, and other corvids

[4] Miller, S.L., M.G. Raphael, G.A. Falxa, C. Strong, J. Baldwin, T. Bloxton, B.M. Galleher, M. Lance, D., Lynch, S.F. Pearson, C.J. Ralph, R.D. Young. 2012. Recent population decline of the marbled murrelet in the Pacific Northwest. Condor 114(4):1-11.

prey on murrelet chicks and eggs, especially when nests are located near openings in the forest canopy and therefore easier for predators to find.

An HCP is a required component of an application for an incidental take permit, which is required when activities such as timber harvest on non-federal lands have the potential to result in incidental take of a threatened or endangered species. Incidental take is harm or harassment of individuals of a listed species when such take is incidental to, not the purpose of, lawful activities, and includes modification or harvest of habitat.

A marbled murrelet is a robin-sized seabird that feeds on the ocean and nests in forests located within 55 miles of marine waters.

Photo courtesy www.HamerEnvironmental.com

The 1997 HCP includes four habitat conservation strategies: a marbled murrelet, northern spotted owl, riparian, and multispecies strategy. However, because knowledge of marbled murrelet biology was limited at the time, the marbled murrelet conservation strategy in the 1997 HCP was considered interim, to be replaced with a long-term conservation strategy when more information was available. **DNR now is developing the long-term strategy and is near the end of the process**. When complete, it must be approved by USFWS and adopted by the Board. Like the interim strategy, the long-term strategy will apply to all DNR-managed lands within the range of the marbled murrelet in Washington State (state trust lands and DNR-managed natural areas within 55 miles of marine waters). The long-term conservation strategy will provide **legal certainty and management predictability for ongoing operations on DNR-managed lands, and long-term protection for the marbled murrelet**.

DNR's approach to the long-term strategy is summarized in the Board's "preferred alternative," which is analyzed in the marbled murrelet long-term conservation strategy environmental impact statement (EIS) as "Alternative H" along with the interim strategy and five others. The preferred alternative would restrict harvest on 610,000 acres. This total includes both the 567,000 acres on which DNR restricts harvest to meet the requirements of its 1997 HCP and the *Policy for Sustainable forests*, plus 43,000 acres specifically for marbled murrelets. Conservation would be focused into 29 "special habitat areas." A special habitat area is a block of forest in which murrelet habitat is protected and grown to minimize openings in the forest canopy that would give jays, crows, and other predators easy access to murrelet

Falxa, Gary A.; Raphael, Martin G., tech. coords. 2016. Northwest Forest Plan—the first 20 years (1994–2013): status and trend of marbled murrelet populations and nesting habitat. Gen. Tech. Rep. PNW-GTR-933. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 132 p.

nests. Special habitat areas are located in geographic areas considered most important to marbled murrelet conservation, for example habitat that is inland from areas in the ocean with abundant food.

Section Two: Economic Analysis

Understanding This Analysis

In this analysis, DNR compares the potential economic impacts of implementing the proposed long-term strategy (Alternative H, the preferred alternative in the EIS) to continuing management under the interim strategy (Alternative A in the EIS). Although there was general consensus among Solutions Table members on using Alternative H to represent the long-term strategy in this analysis, there was less consensus on comparing Alternative H to Alternative A. Some members suggest that the preferred alternative be compared to *all* of the alternatives DNR developed, not just the interim strategy. Some of these alternatives have more harvest and less conservation, and others have more conservation and less harvest than the preferred alternative. Others feel that the preferred alternative should be compared to the alternative that restricts harvest on the fewest acres, which is Alternative B. And some feel that DNR should be comparing the preferred alternative to pre-1997 economies.

Alternative H was selected by the Board as the **preferred alternative**. The preferred alternative is DNR's **proposed-long term strategy.**

Alternative A is **the interim strategy**.

DNR selected the interim strategy (Alternative A) as a baseline because it best represents how it would manage state trust lands in absense of a long-term strategy. Also, DNR did not feel it could accurately compare the potential economic impacts of the preferred alternative to pre-1997 economies because of the sheer scope of complexities and uncertainties that analysis would involve. Consider employment. It is virtually impossible to determine how many forestry-related jobs have been lost specifically to past marbled murrelet conservation because of the multitude of factors that have affected both DNR harvest levels and the timber industry as a whole in the past several decades.

Rural communities have been struggling for years. Figure 1 shows the change in forestry-related jobs from 1990 in the counties that will be affected by the long-term strategy. Employment has declined from approximately 39,000 jobs in 1990 to approximately 21,000 jobs in 2017.

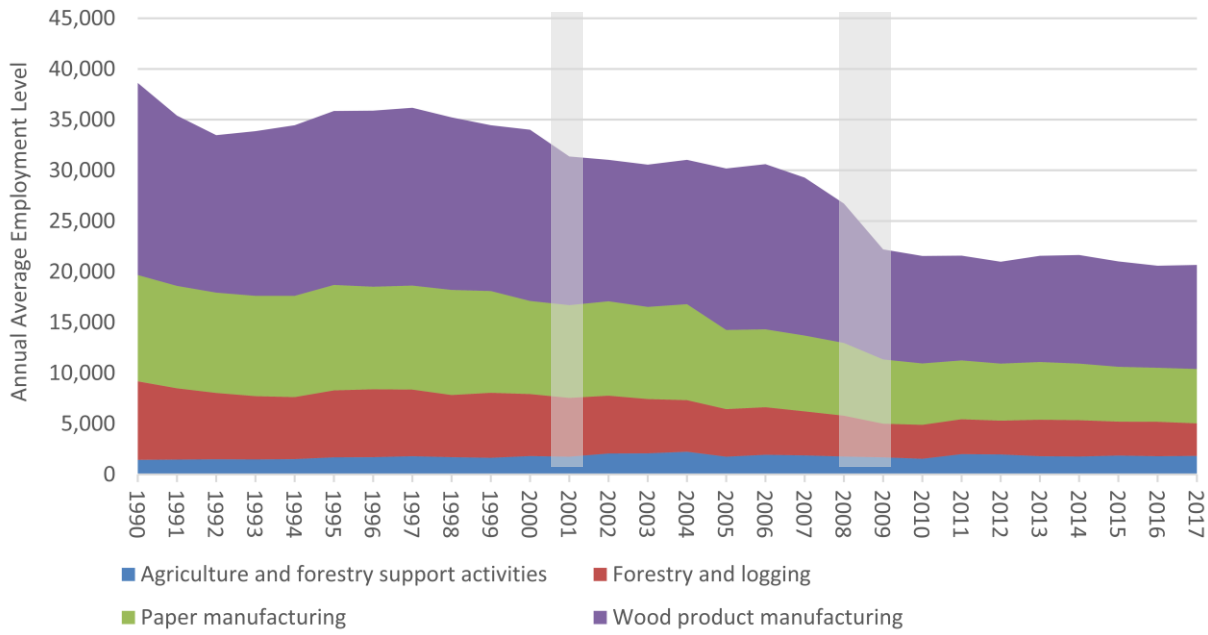

Figure 1: Employment by sector, affected counties

Grey shading indicates major recessions

Counties include Clallam, Grays Harbor, Thurston, Pierce, Lewis, Mason, Kitsap, Klickitat, Skamania, Ferry, King, Clark, Cowlitz, Jefferson, Wahkiakum, Pacific, Whatcom, Skagit, and Snohomish

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

The reasons for these changes are many, complex, and inter-related:

- Automation of tasks in mills and in the forests that used to be performed by human workers.
- The listing of the northern spotted owl and marbled murrelet under the ESA, which resulted in significantly fewer acres available for active timber management on federal and state forests in the Pacific Northwest.
- Consolidation of mills and mill ownership, which can increase efficiency but also can reduce employment.
- Changes in overseas markets that affect export and domestic log prices.
- Conversion of working forest to agricultural, commercial, residential, or urban uses, which also reduced the overall acres available for active timber management.
- Recessions. As shown in Figure 1, employment in timber-related jobs declined steeply in the Great Recession (2008 through 2009). Job losses leveled off after the recession but never recovered to pre-recession levels.

- Rising labor costs, which can lead to efficiency improvements to process the same or more logs with fewer workers.

DNR understands that comparing Alternative A to H does not tell the entire story of the impacts of murrelet conservation on the counties included in this analysis. However, DNR believes this comparison will assist the Solutions Table in addressing the challenge at hand, which includes addressing future as well as current economic impacts, and best meets the direction given in ESHB 2285.

Methods

In the following analysis, DNR will discuss the following core impacts:

- Changes to harvest volume and stumpage value (Table 1),
- Changes to trust revenue (Table 2), and
- Changes to employment and economic outputs (Table 3 through 5).

DNR used two models to develop estimates for this analysis: a forest estate model and a modified IMPLAN input-output (I-O) model. A forest estate model is a mathematical model used to determine the optimal placement and timing of harvest over time and across a land base to meet multiple revenue and ecological objectives. An I-O model is a quantitative economic model that can be used to understand the interdependencies between different parts of an economy.

DNR used the forest estate model to estimate the volume of timber that will be harvested in each decade under the long-term strategy. DNR also estimated stumpage, which is the price at which DNR sells timber. Stumpage is estimated as dollars per thousand board feet.

These estimates were used in the I-O model to estimate potential impacts to trust revenue, employment, and economic outputs **in the first decade *only***[5]. Because I-O models are static, meaning they do not take into account market adaptations such as price changes or substitutions, it is inappropriate to rely on their outputs too far in the future from their base year (in this case, 2016). This limitation is readily understood in the timber and wood processing context. The industry was very different in 2016 compared to 2006, and even more different from 1996. Therefore **predicting economic output changes in 2027 and beyond from 2016 data would be misleading and probably inaccurate**. This analysis is best thought of as a "contribution" analysis, meaning that the harvest volumes contribute to this output and these jobs.

[5] The I-O model uses 2016 market relationships adjusted to 2018 values; the forest estate model has actual data through the end of 2017.

At the end of this report, DNR also will discuss ecosystem services and their potential contribution to rural economies.

Linkage to the Sustainable Harvest Level

For this analysis, it was essential to consider the long-term strategy in conjunction with arrearage[6] and riparian options being considered for the sustainable harvest level[7], which is being developed in a parallel effort. Therefore, for this analysis the long-term and interim strategies were modeled such that:

- 382 million board feet (MMBF) of arrearage volume *was* included in the sustainable harvest level, meaning the sustainable harvest level was increased by 382 MMBF. The Board selected 382 MMBF as its preferred arrearage option for the sustainable harvest level.

- Per Board direction, harvest volume from thinning in riparian areas *was not* included in the sustainable harvest level, meaning that the forest estate model was not required to meet any specific acreage targets for harvest in riparian areas.

Because both strategies were modeled using the same options for arrearage and riparian areas, differences in harvest levels between the strategies are due solely to differences in marbled murrelet conservation.

The interim strategy was modeled differently in both the *Draft Financial Analysis of Alternatives for Establishment of a Sustainable Harvest Level for Forested State Trust Lands in Western Washington* (financial analysis), which was published in 2017 and revised in October 2018, and also from the sustainable harvest level draft EIS, published in 2016:

- In the financial analysis, the interim strategy was paired with three options for arrearage volume: 702 MMBF, 462 MMBF, and an option in which the harvest level is set with no specific quantity of arrearage harvest. The interim strategy also was paired with two options for riparian thinning. One option was to thin up to 10 percent of the total riparian area in the planning decade. The second option was to thin an area less than or equal to 1 percent of the acres thinned or harvested in non-riparian areas.

- For the sustainable harvest draft EIS, the interim strategy was paired with 702 MMBF of arrearage volume and the 1 percent option for riparian thinning. This strategy also reflected the current authorizing environment. The interim strategy was modeled with a harvest level of 5.5

[6] Arrearage is the difference between planned and actual harvest. In the previous planning decade for the sustainable harvest level (2005 through 2015), DNR harvested less timber than planned, so that amount was carried into the new planning decade as arrearage.
[7] The sustainable harvest level is defined in RCW 79.10.300(5) as "the volume of timber scheduled for sale from state-owned lands during a planning decade as calculated by DNR and approved by the Board."

billion board feet, to reflect continuation of the current sustainable harvest level set by the Board in 2007, and reflected the harvest constraints of the Settlement Agreement (King County Superior Court No. 04-2-26461-8SEA, dismissed April 7, 2006), which will expire when DNR adopts a new sustainable harvest level.

Results

Changes to Harvest Volume and Stumpage Value

Table 1 shows a projection of harvest volume and stumpage value by decade for the interim strategy and the long-term strategy. As mentioned previously, these projections come directly from the forest estate model. These estimates could change as DNR conducts additional analysis to support the Board's decision-making process. Also, since DNR re-calculates the sustainable harvest level at the start of each planning decade, actual harvest levels in future decades could be different than shown.

Key Findings for Harvest Volume and Stumpage

- Harvest levels decline under both the long-term strategy and the interim strategy through Decade 5. Harvest levels then gradually increase through Decade 10 under both strategies.
- Harvest volumes under the proposed long-term strategy will be slightly higher than they would be under the interim strategy in the first decade, but somewhat lower in every other decade.

Table 1 demonstrates two key points. First, **harvest levels decline under both the long-term strategy and the interim strategy through Decade 5**. Harvest levels then **gradually increase** through Decade 10 under both strategies. In the cycle of harvesting and replanting forests, the total volume of timber available for harvest across DNR lands is always rising or falling due to prior management, current stand ages, and tree growth rates.

Second, harvest volumes under the proposed long-term strategy will be slightly higher than they would be under the interim strategy in the first decade, but somewhat lower in every other decade. In the first decade, when DNR shifts to special habitat areas, it will release some areas of mature habitat outside these special habitat areas for harvest, causing a temporary increase in harvest volume. These areas of mature forest currently are being held pending adoption of the long-term strategy. In subsequent decades, harvest volumes under the long-term strategy are lower than under the interim strategy primarily because more of the land base (10,000 acres) is designated for marbled murrelet conservation, which reduces the acres available for active timber management.

Table 1: Harvest volume and stumpage value comparison by decade

	Harvest Volume (MMBF)				Stumpage Value (real discounted $ thousands)			
Decade	Interim Strategy	Long-term Strategy	Diff.	% Diff.	Interim Strategy	Long-term Strategy	Diff.	% Diff.
1	4,783	4,794	11	0.2%	$1,558,143	$1,556,873	$-1,270	-0.1%
2	4,031	4,003	-28	-0.7%	$ 961,362	$ 955,093	$-6,269	-0.7%
3	3,655	3,631	-24	-0.7%	$ 634,782	$ 631,562	$-3,220	-0.5%
4	3,150	3,128	-22	-0.7%	$ 411,752	$ 409,854	$-1,899	-0.5%
5	2,951	2,908	-44	-1.5%	$ 294,711	$ 290,654	$-4,057	-1.4%
6	3,190	3,157	-33	-1.0%	$ 238,876	$ 236,434	$-2,442	-1.0%
7	3,607	3,576	-31	-0.9%	$ 201,102	$ 200,251	$ -851	-0.4%
8	4,066	4,037	-29	-0.7%	$ 170,507	$ 168,982	$-1,525	-0.9%
9	4,376	4,336	-40	-0.9%	$ 137,983	$ 136,666	$-1,317	-1.0%
10	4,425	4,387	-39	-0.9%	$ 103,735	$ 102,859	$ -876	-0.8%

Changes to Trust Revenue

Table 2 shows an annual, average estimate of changes in discounted revenue by trust, as well as the share of that value that will go to the trusts and to DNR to pay management costs in the first decade. Table 1 showed that **the estimated difference in stumpage value between the interim strategy and the long-term strategy was -$1,270,000 across affected counties for the decade, which would be -$127,000 annually on average,** as shown in Table 2.

Key Finding for Trust Revenue

The estimated difference in stumpage value between the interim strategy and the long-term strategy was -$1,270,000 across affected counties for the decade, which would be -$127,000 annually on average.

Table 2: Revenue difference—trust revenue and management costs for Decade 1 (real, annual) between interim and long-term strategies*

Trust	Total Stumpage Value Change	Management Costs	Net Trust Revenue	Management %
State Forest Transfer	$1,290,500	$322,600	$967,900	25%
CEPRI	$337,300	$104,600	$232,700	31%
University Original	-$600	-$200	-$400	31%
Scientific School	-$16,900	-$5,200	-$11,700	31%
Escheat	-$66,400	-$20,600	-$45,800	31%
Ag School	-$106,600	$0	-$106,600	0%

Trust	Total Stumpage Value Change	Management Costs	Net Trust Revenue	Management %
Normal School	-$108,700	-$33,700	-$75,000	31%
State Forest Purchase	-$205,100	-$102,600	-$54,400	50%
Common School	-$378,100	-$117,200	-$260,900	31%
University Transfer	-$391,200	-$121,300	-$269,900	31%
Capitol Grant	-$481,000	-$149,100	-$331,900	31%
TOTAL	-$127,000	-$122,700	$43,900	

*Revenue rounded to the nearest $100

** Management costs and net trust revenue for the State Forest Purchase Trust do not equal the value under "Total Stumpage Value Change." The reason is that a portion of the revenue for that trust goes to the state general fund.

Table 3 demonstrates how statewide changes to harvest volume and stumpage value (Table 1) are distributed across affected counties. The harvest volumes are the basis for understanding changes to employment and economic output in the logging and forestry industries in each county. The *consumption* volumes show the estimated volume of wood processed in that industry, taking into account how much wood is processed from within the county and how much is processed from without. For industries downstream of logging and hauling, changes in employment and output are based on changes in consumption volume.

Table 3: Summary of changes by county for Decade 1 (real dollars, annual) between the interim and long-term strategies*

County	Harvest Volume	Consumption Volume	Stumpage Value
Clallam	5,180	2,840	$1,551,500
Grays Harbor	2,341	1,144	$584,400
Thurston	668	0	$233,700
Lewis	204	71	$59,600
Mason	144	-49	$50,600
Cowlitz	68	-244	$23,100
Pierce	54	509	$8,100
Kitsap	10	0	$3,600
Clark	0	-63	$100
Skamania	0	0	$0
Ferry	0	-22	$0
Klickitat	0	0	$0
King	-14	0	-$9,900
Wahkiakum	-540	0	-$365,900

County	Harvest Volume	Consumption Volume	Stumpage Value
Skagit	-833	-1,728	-$289,700
Pacific	-1,300	-363	-$404,600
Jefferson	-1,406	1,043	-$384,800
Snohomish	-1,707	-1,818	-$563,900
Whatcom	-1,813	-263	-$622,800
TOTAL	1,058	1,058	-$127,000

* Note: Revenue rounded to the nearest $100.

Changes to Employment and Economic Output

I-O models estimate economic and employment impacts across an economy by estimating how a change in output for a given industry filters back through that industry's supply chain. For instance, a sawmill that expands its output may need to purchase more hauling services. The company that provides those hauling services may hire more people, and the people in those jobs will spend money on groceries, gas, healthcare, and so forth. I-O models usually separate these impacts into direct, indirect, and induced impacts:

- Direct impacts are those that happen in the specific industry experiencing the shock, the sawmill in this case;
- Indirect impacts are those in industries up the supply chain, hauling services in this example; and
- Induced impacts are those that result from increased spending from labor income.

Key Finding for Employment and Economic Output

Harvest volume under the long-term strategy in the first decade annually may support approximately 12 more jobs across the state economy, with approximately 5 of those jobs in logging or a wood processing industry.

These impacts are not evenly distributed across counties nor across industries, within a single county. Even though a net gain in statewide harvest volume may occur in Decade 1, some counties, industries, and trusts may experience losses.

The model suggests that, compared to the interim strategy, **harvest volume under the long-term strategy in the first decade annually may support approximately 12 more jobs across the state economy, with approximately 5 of those jobs in logging or a wood processing industry.** The results also show economic output across the economy increasing by $2.5 million annually, of which $1.6 million is from logging or wood processing industries (Tables 1 and 2, respectively).

It is important to note that **these impacts are not evenly distributed across counties nor across industries within a single county**. **Even though a net gain in statewide harvest volume may occur in Decade 1, some counties, industries, and trusts may experience losses.**

Tables 4 and 5 present estimates of the differences in employment and economic output between the interim and long-term strategies for each affected county.

Table 4: Employment impacts by county for Decade 1 (annual), difference between interim and long-term strategies

County*	Direct Employment	Indirect Employment	Induced Employment	TOTAL
Clallam	19.7	7.4	6.9	34.0
Grays Harbor	10.0	3.5	3.4	16.9
Thurston	1.6	0.3	0.7	2.5
Pierce	1.3	0.4	0.5	2.3
Lewis	0.7	0.2	0.2	1.1
Mason	0.2	0.0	0.0	0.2
Kitsap	0.0	0.0	0.0	0.1
Klickitat	0.0	0.0	0.0	0.0
Skamania	0.0	0.0	0.0	0.0
Ferry	-0.1	0.0	0.0	-0.1
King	0.0	0.0	0.0	-0.1
Clark	-0.2	-0.1	-0.1	-0.3
Cowlitz	-0.5	-0.2	-0.2	-0.9
Jefferson	-1.3	1.2	-1.0	-1.2
Wahkiakum	-1.3	-0.3	-0.1	-1.7
Pacific	-4.1	-0.8	-2.0	-6.9
Whatcom	-5.1	-1.1	-1.8	-8.1
Skagit	-6.6	-1.4	-2.8	-10.8
Snohomish	-9.0	-1.2	-5.0	-15.2
TOTAL	5.4	7.9	-1.3	12.0

* Note: only counties where employment or output change was identified are listed; some “0.0” values are very small non-zero values.

Table 5: Output impacts by county for Decade 1 (real dollars, annual), difference between interim and long-term strategies

County*	Direct Output	Indirect Output	Induced Output	TOTAL
Clallam	$3,484,300	$798,600	$735,800	$5,018,800
Grays Harbor	$2,029,800	$494,200	$379,100	$2,903,100
Thurston	$856,200	$190,500	-$101,500	$945,300
Pierce	$353,100	$64,600	$61,900	$479,600
Lewis	$138,300	$26,300	$78,200	$242,800
Mason	$91,300	$18,200	$24,200	$133,700
Kitsap	$4,800	$400	$2,300	$7,500
Klickitat	$0	$0	$0	$100
Skamania	$0	$0	$0	$0
Ferry	-$3,800	-$800	-$700	-$5,300
King	-$9,200	-$600	-$4,700	-$14,500
Clark	-$23,600	-$3,000	-$1,700	-$28,300
Cowlitz	-$44,200	-$7,200	-$5,700	-$57,100
Jefferson	-$81,500	-$23,100	-$16,300	-$120,900
Wahkiakum	-$160,300	-$45,500	-$21,800	-$227,500
Pacific	-$538,000	-$114,900	-$201,100	-$854,000
Whatcom	-$723,500	-$72,500	-$189,700	-$985,700
Skagit	-$1,631,300	-$190,300	-$312,000	-$2,133,700
Snohomish	-$2,364,600	-$140,300	-$563,900	-$3,068,800
TOTAL	$1,377,900	$994,700	-$137,700	$2,234,900

* Only counties where employment or output change was identified are listed; rounded to the nearest $100.

Ecosystem Services

This economic analysis has focused on the potential economic gains or losses as they relate to harvest volumes under the long-term strategy. This section will address the potential economic gains of managing forests for ecosystem services, which are the benefits that people gain from functioning ecosystems. Examples of ecosystem services include air and water filtration, food, medicines, and other benefits.

Economic gains for ecosystem services can come through a variety of payment mechanisms. Payments can provide income to trust beneficiaries or they can be used to purchase additional lands for either

conservation or timber production. Management of these lands or the completion of forest projects involved in these payment mechanisms could support jobs.

- **Carbon compliance markets:** These markets are one of the most well-developed payment mechanisms for ecosystem services. For example, under California's cap and trade system, forest landowners from across the country can complete forest projects under the California Air Resources Board's protocols to generate offset credits. Offset credits also can come from avoided emissions protocols, which involve preventing emissions that would occur if forests were converted to non-forest uses. These offset credits can be sold to entities in California that are required to reduce their greenhouse gas emissions. Carbon offset credits in this market are trading for approximately $13.50 per metric ton of CO_2 sequestered. Prices are likely to increase as the cap lowers (in other words, the limits on greenhouse gas emissions become more stringent). Over 112 million credits have been issued for forest projects across the US since 2012[8].

- **Voluntary carbon markets:** There is a relatively robust national and international voluntary carbon market. For example, the Verified Carbon Standard provides protocols and standards for development of projects that reduce greenhouse gas emissions. Projects that meet rigorous rules and requirements are issued credits, which are purchased by voluntary buyers such as Microsoft, Chevrolet, and others who see it in their interest and as a social obligation to offset their emissions. The overall voluntary market has produced nearly 100 million tons of emission reductions through forestry projects since 2005[9].

- **Watershed protection services:** In this market, municipalities either purchase forestland or pay both private and public land managers to protect and manage forests at a watershed scale to ensure drinking water quality, prevent siltation, maintain water flow, and protect sensitive aquatic habitat beyond what is provided for through existing regulatory mechanisms. Rate payer fees, grants from state and federal funds, and low interest loans from the Clean Water Act Revolving Fund all have been used to purchase forestland for watershed protection services. One example of this market from Washington State is the use of ratepayer funds from the City of Olympia to protect forestlands in their main aquifer recharge area in the Nisqually watershed. Another is the use of Puget Sound Acquisition and Restoration Funds for purchase of lands for a community forest in the upper Mashel watershed[10]. These lands will be managed to restore steelhead habitat, maintain higher water flows in summer than would occur otherwise, and

[8] Refer to the California Air Resources Board website: https://www.arb.ca.gov/cc/capandtrade/offsets/issuance/arb_offset_credit_issuance_table.pdf
[9] From Voluntary Market Insights: 2018 Outlook and First Quarter Trends. Forest Trends. https://www.forest-trends.org/wp-content/uploads/2018/09/VCM-Q1-Report_Full-Version-2.pdf
[10] Refer to Puget Sound Partnership's Puget Sound Acquisition and Restoration Funds page: http://psp.wa.gov/PSAR.php

protect drinking water for the Town of Eatonville. Private payment mechanisms are emerging as well. For example, corporations dependent on reliable sources of clean water pay landowners for management practices that safeguard those sources[11].

- **Mitigation/conservation banking and green bonds:** A mitigation bank is a wetland, stream, or other aquatic resource area that has been restored, established, enhanced, or (in certain circumstances) preserved for the purpose of providing compensation for unavoidable impacts to aquatic resources permitted under Section 404 of the federal Clean Water Act or a similar state or local wetland regulation[1213]. A conservation bank is a permanently protected area that has natural resource values[14]. The value of these banks is defined in credits which can be purchased to offset ecological losses elsewhere. Green bonds are tax-exempt bonds issued by public entities that are meant to be used for projects that benefit the environment. [15]

Aside from payment mechanisms, another way in which forests managed for ecosystem services can provide economic gains is through increased recreation. Recreation could be more likely on lands that are less heavily harvested, and could generate economic activity in local communities by attracting more visitors who then pay for hotels, food, and supplies. It is also possible to charge fees for using these lands.

The Solutions Table can explore these options, along with numerous other creative ideas, as it moves through the investigative phase of developing recommendations.

[11] Alliance for Green Infrastructure—State of Watershed Investments 2016. https://www.forest-trends.org/wp-content/uploads/2017/03/2016SOWIReport121416.pdf
[12] https://www.epa.gov/cwa-404/mitigation-banking-factsheet
[13] EPA, Compensatory Mitigation Fact Sheet
[14] https://www.fws.gov/endangered/landowners/conservation-banking.html
[15] https://www.thebalance.com/what-are-green-bonds-417154

Section Three: Recommendations

Consistent with RCW 43.30.583, DNR has convened a multi-stakeholder group to serve as the marbled murrelet advisory committee (the "Solutions Table") to assist in developing the recommendations called for in RCW 43.30.582(3). The Solutions Table is comprised of ten representatives, three each from the conservation, beneficiary, and jobs/economic-development perspectives, and is chaired by Commissioner of Public Lands Hilary Franz. Solutions Table members are listed in Table 6.

Table 6: Solutions Table members

Name	Affiliation	Representing
Dan Cothren	Wahkiakum County	Beneficiary interests
Paul Jewell	Washington Association of Counties	Beneficiary interests
Brian Sims	Washington State School Directors' Association	Beneficiary interests
Lisa Remlinger	Washington Environmental Council	Conservation interests
Paula Swedeen	Conservation Northwest	Conservation interests
Patricia Jones	Olympic Forest Coalition	Conservation interests
Travis Joseph	American Forest Resource Council	Jobs/Economic interests
Connie Beauvais	Port of Port Angeles	Jobs/Economic interests
Jim Sayce	Pacific County Economic Development Council	Jobs/Economic interests
Hilary Franz	Commissioner of Public Lands	DNR

Guiding Principles

In convening the Solutions Table, DNR observed that because of the competing legal imperatives established by the ESA and the state's fiduciary responsibility, two outcomes are assured:

- The long-term strategy will involve setting some forested state trust lands aside from timber harvest as habitat for the marbled murrelet, per the requirements of the ESA. Setting these lands aside will result in reduced harvest volumes and economic activity and corresponding reductions in revenues for local government services such as school construction.
- DNR must provide enough habitat to meet the requirements of the ESA but it cannot provide more, if doing so will negatively impact trust beneficiaries. (Note that some stakeholders

disagree with DNR's legal interpretation of the trust mandate[16] and believe DNR has more discretion to take additional steps to conserve the murrelet, while others feel that the amount of conservation DNR has proposed exceeds ESA requirements.)

There is general consensus among Solutions Table members that their role is to address not only the potential, future economic impacts of the long-term strategy (as compared to the interim strategy), but also the current economic condition of counties included in the long-term strategy. Likewise, solutions also must be considered with the understanding that **murrelet populations have declined 3.9 percent *per year*** between 2001 and 2016[17].

The Solutions Table explicitly rejects the premise that a choice must be made between protecting a species and ensuring critical services, jobs, and economic health in communities. Instead, Solutions Table members have agreed to work together to support trust land beneficiaries, timber-related jobs, and marbled murrelet protection. Their working-draft mission statement is as follows:

> "Design achievable, implementable solutions that are in addition to whatever outcomes transpire from ongoing Board of Natural Resources decision processes related to the marbled murrelet, and which lead to: improved survival and recovery potential for the marbled murrelet; additional stable and sustainable revenue to beneficiaries; and growth of timber-related jobs in rural communities through, for example, enhanced forest management, sustainable harvest, and value-added in-state timber processing."

In addition, Solution Table members:

- Have expressed individual and mutual commitment to owning one another's challenges and aspirations and working together to turn ideas about solutions into reality.
- Agree that the Solutions Table effort be held apart from Board decisions, and that members are free to continue to engage and advocate for their individual interests in the Board's decision processes for the long-term strategy, separate from the Solutions Table.
- Realize that the ideas developed in this process may be useful to the Board in their implementation of the 1997 HCP.
- Agree that the purpose of the Solutions Table is to improve outcomes for timber-related jobs, beneficiary revenue, and marbled murrelet conservation, regardless of what the Board decisions provide.

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[16] Two of the common law duties of a trustee, acting with undivided loyalty to trust beneficiaries to exclude all other interests and prudent management of trust assets, are collectively referred to as the trust mandate.

[17] Pearson, S.F., B. McIver, D. Lynch, N. Johnson, J. Baldwin, M.M. Lance, M.G. Raphael, C. Strong, and R. Young, T. Lorenz, and K Nelson. 2018. Marbled murrelet effectiveness monitoring, Northwest Forest Plan: 2017 summary report. 19 pp.

While RCW 43.30.582(2) requires that DNR analyze economic gains and losses resulting from the Board's process to adopt a long-term strategy, the Solutions Table is broadly oriented towards "more" in all three areas (trust land beneficiaries, timber-related jobs, and marbled murrelet protection) rather than minimally attempting to mitigate the specifics of eventual Board decisions.

Progress to Date

The Solutions Table has met eight times since convening in July 2018: five all-day, in-person meetings and three shorter conference calls. To begin this process, the Solutions Table:

- Confirmed their common understanding of their charge and work expectations.
- Received background briefings from DNR on the interim strategy, the status of long-term strategy development, and marbled murrelet population status and trends.
- Provided input into the scope of, and approach to, the economic analysis in this report.
- Determined how they wish to work together.
- Shared their individual perspectives on the state of timber harvest, jobs and economic development in rural communities, marbled murrelet population trends, and beneficiary revenue along with their individual hopes for outcomes from the Solutions Table process.
- Toured a site near Raymond to observe timber stands being managed for murrelet habitat.

With initial convening and background activities complete, the Solutions Table is now **focused on developing specific recommendations** for the following, as required by RCW 43.30.582(3):

- Actions that support maintaining or increasing family-wage timber and related jobs in the affected rural communities, taking into account, as appropriate, the role of other market factors;
- Strategies to ensure no net loss of revenues to the trust beneficiaries due to the implementation of additional marbled murrelet conservation measures;
- Additional means of financing county services; and
- Additional reasonable, incentive-based, non-regulatory conservation measures for the marbled murrelet that also provide economic benefits to rural communities.

Following are the Solution Table's goals for this work:

- To develop a solid set of potential solutions, a shared sense of what each potential solution might accomplish for jobs, marbled murrelets, and beneficiaries, and an understanding of what each solution would take to implement.

- To prioritize solutions that would benefit two or more interests at the same time while having no or neutral impact on the third interest. However, the Solutions Table acknowledges the group needs to be open to packages of solutions that are more specifically focused on an individual interest, but taken together address all three.

Potential solutions will be sorted into those that can be implemented relatively quickly and those that would take more time. It also may be useful to sort potential solutions by their budgetary, administrative, and policy implications.

The Solutions Table has generated numerous creative ideas and is now in the investigative phase, in which ideas are thoroughly vetted to translate them into a smaller list of specific, actionable recommendations. **This work is ongoing**. Rather than present a partial list of ideas under consideration, the Solutions Table would prefer to wait until the ideas have been **vetted, prioritized, considered in the context of all three interests, and sorted as described**. To inform discussions, DNR staff and Solutions Table members will, between meetings, continue to gather data and other information that is crucial to understanding the validity of each idea.

Solutions Table meetings, including conference calls, are open to the public and an opportunity for public comment is provided at each meeting. Agendas, meeting summaries, and other materials are available on the Solutions Table website at https://www.dnr.wa.gov/SolutionsTable.